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LETTERS TO THE EDITOR.

** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as a proof of good faith.

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The Editor will be glad to publish any queries consonant with the character of the journal.

Cats Hunting Snakes.

It was a novel idea to the writer, that of our domestic cat appearing in the capacity of a serpent-killer; but as two independent accounts have recently come to his knowledge, from competent observers, this note is sent to *Science*, partly for its interest and partly in the hope of eliciting further evidence.

A family living in southern New Jersey have a cat, not large or powerful, but very lithe and active, that has been in the habit of going off to the woods and returning with dead snakes of different species, up to three or four feet in length. After dragging it home, she would proceed to eat the snake and was often interrupted and the prey taken from her by members of the family, who were horrified at the proceeding. On one occasion, a violent flurry among the hens was noticed, and it was found to be due to the approach of a black snake, fully a yard long. The cat had reached the spot, however, before the family, and her *modus operandi* was witnessed. She attacked the snake by repeatedly springing upon it, and endeavoring to seize it with his teeth, immediately behind the head. After a few such assaults, the cat killed it, and in due time proceeded to eat it, as usual, although it was then removed.

On relating this incident in a company of scientific friends it was generally regarded as novel; but one gentleman described a precisely similar action witnessed by him in Harlem, N.Y. A disturbance was observed in the rear garden, and the large family cat was found making just

such attacks upon a garter-snake between two and three feet long. The snake was partly protected under a dense clump of rose bushes, and the cat had difficulty in seizing it, but kept springing at the neck, as in the other case. The gentleman at once interfered, and dispatched the reptile with a stick. But it would seem from these instances that snake hunting is a habit with some cats. Is it so with many? Perhaps some readers of *Science* can help us to judge how far it is familiar.

D. S. MARTIN.

The American Box Tortoise.

PERMIT me to call the attention of those interested in zoölogy to the North American box tortoise or *Terrapene* (*Cistudo*). In working over the material so far collected we notice no mention of material from Georgia, Tennessee, Alabama, Kentucky, the Dakotas, New Mexico or western Texas. Neither are specimens reported from Mexico excepting Mexico City. Specimens are vaguely reported to have been found in Canada, but no specimens seem to be preserved and no authentic records are known. It is commonly supposed that the *Terrapene* (*Cistudo*) does not exist west of the Rockies. If any person has evidence to the contrary we would like to know it. We would request all who can give us aid on any of these points to write us. If possible we would like to receive specimens from any locality whatever. The comparatively fixed habitation of this genus renders a large collection including many localities highly desirable. Persons who may have any of these specimens on hand, but do not care to part with them, would confer a great favor by lending them. Favors rendered in this way would be fully appreciated and remembered. All packages or communications should be addressed to undersigned, Walker Museum, University of Chicago, Chicago, Ill.

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TO EXCHANGE.—Herbarium specimens. Address, H. P. Chandler, Beaver Dam, Wisc.

KARYOKINETIC FIGURES IN MAMMALIAN TISSUES.—Since the publication of my Preliminary Notice in *Science* for Dec. 1, 1893, many parties have written me asking for permanent preparations showing mitosis. To these parties I have sent slides, and I now offer to all who desire them slides showing mitotic figures in nuclei of embryo kitten. A good immersion objective is necessary to make out the figures satisfactorily. Send 60 cents in stamps. If the slide is not satisfactory, return it, and I will return the money. I do not care to exchange slides. Frank S. Aby, State University, Iowa City, Iowa.

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WANTED.—A copy of Chapman's Flora of the Southern United States. I have on hand for sale or exchange sets of the lichens of this vicinity. List furnished on application. Address, C. F. Maxwell, Box 127, Dublin, Tex.

WANTED.—Addresses of persons interested in archaeology. Copies of the new archaeologic journal in exchange for lists of collectors. A collection of 10,000 valuable objects, the results of my nine years' exploration in the Mississippi Valley, for sale. Price, \$7,650. Warren K. Moorehead, Waterloo, Indiana.

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What is the Problem?

In seeking a means of protection from lightning discharges, we have in view two objects,—the one the prevention of damage to buildings, and the other the prevention of injury to life. In order to destroy a building in whole or in part, it is necessary that work should be done; that is, as physicists express it, energy is required. Just before the lightning discharge takes place, the energy capable of doing the damage which we seek to prevent exists in the column of air extending from the cloud to the earth in some form that makes it capable of appearing as what we call electricity. We will therefore call it electrical energy. What this electrical energy is, it is not necessary for us to consider in this place; but that it exists there can be no doubt, as it manifests itself in the destruction of buildings. The problem that we have to deal with, therefore, is the conversion of this energy into some other form, and the accomplishment of this in such a way as shall result in the least injury to property and life.

Why Have the Old Rods Failed?

When lightning-rods were first proposed, the science of energetics was entirely undeveloped; that is to say, in the middle of the last century scientific men had not come to recognize the fact that the different forms of energy—heat, electricity, mechanical power, etc.—were convertible one into the other, and that each could produce just so much of each of the other forms, and no more. The doctrine of the conservation and correlation of energy was first clearly worked out in the early part of this century. There were, however, some facts known in regard to electricity a hundred and forty years ago; and among these were the great power of points for an electric spark, and the conducting power of metals. Lightning-rods were therefore introduced with the idea that the electricity existing in the lightning-discharge could be conveyed around the building which it was proposed to protect, and that the building would thus be saved.

The question as to dissipation of the energy involved was entirely ignored, naturally; and from that time to this the efforts of the best endeavors of the interested, lightning-rods constructed in accordance with Franklin's principle have not furnished satisfactory protection. The reason for this is apparent when it is considered that the electrical energy existing in the atmosphere before the discharge, or, more exactly, in the column of electricity from the cloud to the earth, above referred to, reaches its maximum value on the surface of the conductors that chance to be within the column of electricity; so that the greatest display of energy will be on the surface of every lightning-rod that were meant to protect, and damage results, as so often proves to be the case.

It will be understood, of course, that this display of energy on the surface of the old lightning-rods is aided by their being more or less insulated from the earth, but in any event the very existence of such a mass of metal as an old lightning-rod can only tend to produce a disastrous dissipation of electrical energy upon its surface,— "to draw the lightning," as it is so commonly put.

Is there a Better Means of Protection?

Having cleared our minds, therefore, of any idea of conducting electricity, and keeping clearly in view the fact that in providing protection against lightning we must furnish some means by which the electrical energy may be harmlessly dissipated, the question arises, "Can an improved form be given to the rod so that it shall do this dissipation?"

As the electrical energy involved manifests itself on the surface of conductors, the improved rod should be metallic; but, instead of making a large rod, suppose that we make it comparatively small in size, so that the total amount of metal running from the top of the house to a point a little below the foundations shall not exceed one pound. Suppose, again, that we introduce numerous insulating joints in this rod. We shall then have a rod that experience shows will be readily destroyed—will be readily dissipated—when a discharge takes place; and it will be evident, that, so far as the electrical energy is consumed in doing this, there will be the less to do other damage.

The only point that remains to be proved as to the utility of such a rod is to show that the dissipation of such a conductor does not tend to injure other bodies in its immediate vicinity. On this point I can only say that I have found no case where such a conductor (for instance, a bell wire) has been dissipated, even if resting against a plastered wall, where there has been any material damage done to surrounding objects.

Of course, it is readily understood that such an explosion cannot take place in a confined space without the rupture of the walls (the wire cannot be boarded over); but in every case that I have found recorded this dissipation takes place just as gunpowder burns when spread on a board. The objects against which the conductor rests may be stained, but they are not shattered.

I would therefore make clear this distinction between the action of electrical energy when dissipated on the surface of a large conductor and when dissipated on the surface of a comparatively small or easily dissipated conductor. When dissipated on the surface of a large conductor,—a conductor so strong as to resist the explosive effect,—damage results to objects around. When dissipated on the surface of a small conductor, the conductor goes, but the other objects around are saved.

A Typical Case of the Action of a Small Conductor.

Franklin, in a letter to Collinson read before the London Royal Society, Dec. 18, 1755, describing the partial destruction by lightning of a church-tower at Newbury, Mass., wrote, "Near the bell was fixed an iron hammer to strike the hours; and from the tail of the hammer a wire went down through a small gimlet-hole in the floor that the bell stood upon, and through a second floor in like manner; then horizontally under and near the plastered ceiling of that second floor, till it came near a plastered wall; then down by the side of that wall to a clock, which stood about twenty feet below the bell. The wire was not bigger than a common knitting needle. The spire was split all to pieces by the lightning, and the parts flung in all directions over the square in which the church stood, so that nothing remained above the bell. The lightning passed between the hammer and the clock in the above-mentioned wire, without hurting either of the floors, or having any effect upon them (except making the gimlet-holes, through which the wire passed, a little bigger), and without hurting the plastered wall, or any part of the building, so far as the above-said wire and the pendulum-wire of the clock extended; which latter wire was about the thickness of a goose-quill. From the end of the pendulum, down quite to the ground, the building was exceedingly rent and damaged. . . . No part of the structure above the floor, small wire, between the clock and the hammer, could be found, except about two inches that hung to the tail of the hammer, and about as much that was fastened to the clock; the rest being exploded, and its particles dissipated in smoke and air, as gunpowder is by common fire, and had only left a black smutty track on the plastering, three or four inches broad, darkest in the middle, and fainter towards the edges, all along the ceiling, under which it passed, and down the wall."

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